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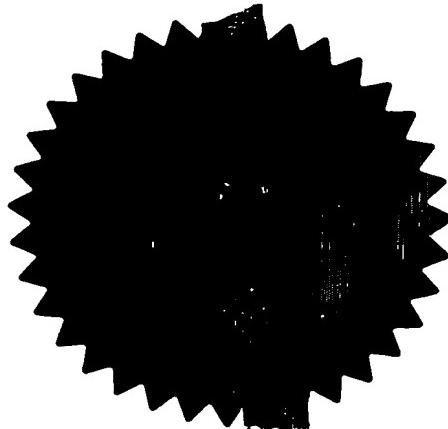
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Cognifex Limited  
314 Nelson Road  
Twickenham  
Middlesex TW2 7AH, United Kingdom

Patents ADP number (if you know it)

08755548001

United Kingdom

If the applicant is a corporate body, give the  
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4. Title of the invention

Containers

5. Name of your agent (if you have one) Williams Powell

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GB 0313627.2

12 June 2003

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DUPLICATE

CONTAINERS

The present invention relates to containers.

- 5 There is a great deal of competition between manufacturers of different brands of product to attract their target consumers. Manufacturers do not just rely on the qualities of the products themselves, but design the containers in which products are packaged to attract the consumer. This can be achieved in many ways, for example by colourful or eye-catching labelling or by the design of the shape or style of the container itself. This may  
10 apply in particular where the container is integral with the product itself, for example a container in which foodstuffs or drink may be held.

The present invention seeks to provide an output signal, which may be a significant visual or other sensory indication to a consumer on opening, or other handling, of a  
15 container.

Many containers especially those in which foodstuffs are packaged, are designed to communicate information relating to the safety of their contents. For example, the lids of jars do not "pop up" until opened, thus indicating whether or not they have previously  
20 been opened. The present invention also seeks to provide an alternative indication that a container has not been previously opened.

According to a first aspect of the present invention, there is provided a portable container, including means for producing an output signal, means of detecting opening of  
25 the container, a self-contained power source, and connecting means for connecting the means for producing an output signal with the means of detecting opening of the container and the self-contained power source, such that on opening the container the power source causes production of an output signal.

- 30 Preferably the output signal comprises a form of sensory stimulation.

The output signal is preferably light. This provides a significant visual indication to a consumer.

- In a preferred embodiment, the container is substantially filled with a flowable or
- 5 dispensable product, which may be a consumable product.

The container preferably contains a single product.

The container is preferably a bottle, a jar or a paste dispenser.

10

Preferably the means for producing an output signal comprise at least one light-emitting diode (LED), as LEDs have low power requirements.

The container may be partially illuminated, to give a different visual effect.

15

The container may include a symbol or logo, and the symbol or logo may be illuminated.

- The connecting means preferably comprise an electric or electronic circuit, and the means of detecting opening of the container preferably comprise the opening or the
- 20 closing of the circuit.

The output signal may comprise a form of wireless communication

- According to a second aspect of the present invention, there is provided a portable
- 25 container including light-emitting means, event-detecting means, a self-contained power source, and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, wherein the container is at least partially fabricated from a material able to transmit light.

- 30 In a preferred embodiment, the container is substantially filled with a flowable or dispensable product, which may be a consumable product.

The container is preferably a bottle, a jar or a paste dispenser

- 5 The activating event preferably comprises the opening of the container or the non-closure of the container.

The activating event may comprise exposure to a specific temperature or range of temperatures.

- 10 Preferably the means for producing an output signal comprises an LED.

The connecting means preferably comprise an electric or electronic circuit, and the event-detecting means preferably comprise the opening or the closing of the circuit.

- 15 According to a third aspect of the present invention, there is provided a device comprising light-emitting means, event-detecting means, a power source, and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, for use with a container.

20

Preferably the device is in the form of a label for attachment to the container.

The device may be in the form of a symbol or logo.

- 25 According to a fourth aspect of the present invention, there is provided a system for communicating information comprising:  
a portable container;  
the container including event-detecting means;  
display means;  
30 means of communication between the container and the display means;

such that on detection of an event information is communicated to the display means and subsequently displayed,

wherein the means of communication between the container and the display means are wireless.

5

Preferably the display means are capable of transmitting and receiving infra-red signals and the container further includes a circuit containing means for transmitting and receiving infra-red signals.

10 Preferably the information displayed comprises a message.

In the preferred embodiment, the event comprises opening of the container.

According to a fifth aspect of the present invention, there is provided a container  
15 containing a consumable product, including means for producing an output signal, means of detecting opening of the container, a self-contained power source, and connecting means for connecting the means for producing an output signal with the means of detecting opening of the container and the self-contained power source, such that on opening the container the power source causes production of an output signal.

20

According to a sixth aspect of the present invention, there is provided a container including light-emitting means, event-detecting means, a power source, and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, wherein the container is  
25 at least partially fabricated from a material able to transmit light.

According to a seventh aspect of the present invention, there is provided a container including means for producing an output signal, event-detecting means, a power source, and connecting means for connecting the means for producing an output signal with the  
30 event detecting means and the power source, such that on detection of an event the power source causes production of an output signal.

Preferred embodiments of the present invention are described below, by way of example only and with reference to the accompanying drawings, in which:

- Figure 1 is a cross-section of a bottle in accordance with a first embodiment of the  
5 present invention;
- Figure 2 is a cross-section of the bottle of Figure 1 with its cap removed.
- Figure 3 is a diagram of an electronic circuit incorporated in the bottle of Figure 1;
- Figure 4 is a diagram of an electronic circuit of a second embodiment of the present invention;
- 10 Figure 5 is a diagram of an electronic circuit of a third embodiment of the present invention;
- Figure 6 is a diagram showing the arrangement of the terminals of a fourth embodiment of the present invention;
- Figure 7 is a diagram showing the arrangement of the terminals of a fifth embodiment of  
15 the present invention;
- Figure 8 is a diagram showing a sixth embodiment of the present invention;
- Figure 9 is a diagram showing a replaceable cap in accordance with a seventh embodiment of the present invention;
- Figure 10 is a diagram showing a paste dispenser in accordance with an eighth  
20 embodiment of the present invention; and
- Figure 11 is a diagram showing a ninth embodiment of the present invention.

Figure 1 shows a bottle 10, which contains a beverage, sealed by a cap 11. Figure 2 shows the same bottle with the cap removed. The bottle is fabricated from a translucent  
25 material. The bottle has an indentation 12 in its base, in which are situated an LED 13 and coin cell batteries 14. The LED 13 and batteries 14 do not extend below the base of the bottle 10 ensuring that the bottle can rest in a stable manner on its base.

A transistor switch circuit 20 is located on the external surface of the bottle and covered  
30 by a label (not shown). Electrical conductors 15 for the circuitry are situated on the external surface of the bottle and extend to the cap 11. The control circuitry is

implemented with surface mount components. The current requirement and power dissipation of the necessary devices are minimal for low current illumination; the control circuitry is therefore small and unobtrusive and could be implemented as a completely integrated circuit.

5

Figure 3 is a circuit diagram of the transistor switch circuit 20 incorporated into the bottle of Figure 1. The LED 13, batteries 14 and terminals 21, 22 are connected through the circuit via the conductors 15. The terminals 21, 22 are electrically connected together by a conductive cap 11 of the bottle 10 when the cap is applied to the bottle 10 during manufacture. Bipolar junction transistor BJT 26 and field effect transistor 27 act to open or close portions of the circuit depending on its status. The batteries 14 are 3 Volt batteries.

First, second and third resistors 23, 24, 25 are employed to regulate the current. Typical resistance values in Ohms are shown in Figure 3. The first resistor 23 limits the current through the LED to 32 mA. The third resistor 25 allows sufficient charge to build up in the field effect transistor (FET) gate region, unless the terminals 21, 22 are closed in which case all the current in the resistor 25 flows back to the batteries 14. At this point the maximum voltage ( $V_{gs}$ ) that can occur across the gate and source is equal to the voltage across the base emitter junction of the bipolar junction transistor. Since this is well below the gate threshold voltage the FET ceases to allow current to flow from its drain to its source, therefore inhibiting current into the base emitter junction and so shutting off the transistor 26 and stopping current flowing from its collector to its emitter. The circuit thus goes into standby.

25

When the terminals 21, 22 are open the gate charges up via the third resistor 25 and so causes current to flow from its drain to its source via the second resistor 24. The second resistor 24 therefore limits the current being fed into the base emitter junction. The actual amount of current required here depends entirely on the bipolar junction transistor used. When the bipolar junction transistor 26 is fully turned on and is in saturation, current will flow through the first resistor 23 and the LED 13 thus providing

illumination. The first resistor 23 limits the current through the LED 13 to prevent it being damaged by excessive current.

A leakage current of  $1.3 \mu\text{A}$  flows from the batteries through the third resistor 25,  
5 through the closed terminals 21, 22 and back to the batteries 14. The leakage current is maximum when the batteries 14 are fresh and nominally equal to 3 Volts each.

In use, the bottle is of "normal" appearance before opening. On opening the bottle of the embodiment of Figures 1, 2 and 3, the electrical circuit through the cap is opened. This  
10 causes closure of the LED circuit path and emission of blue light by the LED. In this embodiment, the effect lasts for about 15 to 20 minutes depending on the lifetime of the batteries.

There are various advantages of the above-described arrangement. Manufacturers may  
15 wish to visually enhance containers for many reasons, including product promotion, advertising, point of sale, competition based campaigns and general marketing purposes. It could be particularly useful for launching a new brand. "Seasonal" promotion may be desired at certain times of the year (Christmas, for example). This type of visual enhancement could be used to target specific consumers. For example, it may attract  
20 certain consumers to drinking beer..

Although there would be an initial setting-up cost to provide containers as described above, on a large-scale the cost of production will be extremely small. Current manufacturers would be able to easily adapt their facilities in order to produce such  
25 containers.

There are various modifications that can be made to the above-described embodiment. It is particularly envisaged that the bottle contain an alcoholic beverage such as an "alcopop", also known as RTD (ready to drink), or beer, although, as described below,  
30 depending on the purpose for which the present system is used the contents may be

anything, solid, liquid or pressurised gas, ranging from foodstuffs to toxic or hazardous substances.

Removal of the lid of the container is not the only activating event that may be detected

- 5 in order to activate light-emission. Depending on the configuration of the circuit, other examples of activating events may be envisaged. A switch on the base of the container that is depressed when the container is placed on a surface, but released when the container is picked up by a user would result in visual enhancement of the container whilst it is in use. If employed in a bottle of drink sold in a bar, this could encourage  
10 people to drink more quickly and therefore buy more of the product. Such an embodiment may require an initial activating event (for example, removal of the cap), with the automatic base switch being a secondary activating event. The exemplary circuit illustrated in Figure 3 could be easily adapted by one skilled in the art to carry out this function.

15

Other examples of activating events include breaking a seal, tearing off a label or a strip, replacing a label, tilting of the container (for example, whilst drinking from a bottle), change in the level of the contents, magnetic field, or through tampering with the container or its contents. Of course, a manually activated switch could also be used to  
20 activate light-emission.

The activating event could be a change in temperature or by the contents of the container attaining a specific temperature or temperature range. Such an application could be particularly useful as a product enhancement feature by indicating to a consumer that the  
25 contents of the container are at the ideal temperature whereby they are "ready to consume/use". The entire contents of the container may light up indicating that the correct temperature/temperature range has been achieved or alternatively a logo or a specific "temperature icon" may illuminate.

- 30 Additionally or alternatively, illumination may act as indication that the product has been exposed to a particular temperature or a temperature-range outside of a desired range for

a period of time longer than specified in Health and Safety regulations. The container illuminates indicating that the contents are unsafe or undesirable to drink or eat or use. Illumination can thus have a product warning function.

- 5      The activating event could be a change in pressure. For example, if the contents of the container are carbonated, the pressure from within the unopened container can act on a device, such as a membrane switch. With a chosen area of the container designed to be flexible, a membrane switch, or any other type of pressure sensor, can be fitted to respond to the change of internal pressure within the container, when the access seal is  
10     broken, thus providing a method of interfacing the action of opening the container with a circuit. Activation by change in pressure would also serve to indicate unintentional opening or leakage from the container whilst in store

Activation could be by means of communication device for example a mobile telephone  
15     or personal digital assistant. The communication from the communication device to the container may be either digital or analogue and so may be realised by the use of modulated carriers, electromagnetic waves (visible or invisible), sound waves (audible or ultrasonic), pulses, or via direct contact communication. In particular, this could be effected by transmission of an infra-red signal, the detection of which results in  
20     illumination of a container.

Activation via the receipt of an external transmitted signal, such as from a communication device, could prove very effective for competition based campaigns. For example, the container may contain a built in FM receiver enabling it to illuminate upon  
25     receipt of a specific radio signal, indicating that the consumer is a competition winner. The activating event can be caused by the detection of an externally transmitted signal, such as a binary code carried on a radio wave transmission or a locally transmitted electromagnetic signal, suitably arranged such that a device can recognise this signal and understand that this is an activating event. For example, during a sporting event, bottles  
30     consumed within a specific venue could be made to illuminate or flash every time a particular sports team scores.

The activating event could be proximity of two or more containers of the same type within a defined range. This may be implemented, for example, by the use of hall-effect devices, capacitive sensors, and/or other such methods employed for the detection of  
5 physical proximity. Such activation would encourage customers to buy the same brands of beer when they are out in a group of friends i.e. it is a way of increasing the volume sold of a particular brand. The bottles are designed so that if several bottles are held close together, one of the bottles may glow a specific colour if it is a "winning" bottle indicating the customer has won a prize.

10

The first resistor 23 of the circuit shown in Figure 3 may be omitted, although the resulting current levels could damage the LED.

Figure 4 shows an alternative circuit used in a second embodiment of the present  
15 invention. When the gate and source of the n-channel MOSFET 39 ( $2.26 \mu\text{W}$  dissipation) are shorted then  $V_{gs}=0$ , and only a very small leakage current can flow through the MOSFET channel 39, the PNP base-emitter junction 46 ( $6.14 \text{ mW}$  dissipation), resistor 23 and resistor 24. This is insufficient to cause any significant current flow from the emitter to the collector of the PNP bipolar junction transistor 46.  
20 When the short on the gate and source is removed, a greater leakage current flows through drain and source and thus through the base-emitter of the transistor 46 as some charge builds up on the gate via resistor 25 ( $90 \text{ mW}$  dissipation) and resistor 33. The transistor 46 turns on very slightly allowing current to pass through to the LED 13. Consequently a potential is developed across LED 13, thus lifting the gate voltage  
25 further, allowing more current into the base of the transistor 46 and causing more current flow through the LED 13. This feedback effect rapidly causes both transistors to saturate, thus passing maximum current through the LED 13, limited only by the LED's series resistor 25. Placing the short back across gate and source shuts off the MOSFET channel 39 current so preventing flow through the base-emitter of the transistor 46 and so  
30 also shutting this off. This process can be repeated. The main advantage of this circuit

is that the leakage current is in the region of 50nA. This is more than 50 times less than in the circuit of Figure 3. Other configurations are possible.

- Figure 5 shows an alternative circuit used in a third embodiment of the present invention.
- 5 The circuit includes general purpose medium gain (300+) bipolar junction transistors 46, 47. With either of the sets of terminals 21, 22 or 41, 42 closed, the current flow is switched off. For example, if terminals 41, 42 are shorted then  $V_{be}$  of NPN bipolar junction transistor 47 = 0V, and there is therefore no current through the collector-emitter junction of transistor 47. Not only does this stop the current flow through the
- 10 second resistor 44 and the LED 13, it also stops current through the third resistor 45 and hence the base-emitter junction of transistor 46, therefore also turning PNP bipolar junction transistor 46 off. A similar situation arises if terminals 41, 42 are left open and terminals 21, 22 are closed. When both sets of terminals 21, 22; 41, 42 are open then both transistors 46, 47 turn on and saturate. The first resistor 43 and the third resistor 45
- 15 control the base currents and hence the collector-emitter currents, which can only pass through the second resistor 44 and the LED 13. The maximum current through the second resistor 44 and LED 13 is determined by the lower  $\beta$  (DC current gain) value of the two BJTs 46, 47. With fairly well known  $\beta$  values it is possible to omit the second resistor 44 and to control the LED current just with correctly selected values of the first
- 20 and third resistors 43, 45. Each BJT 46, 47 acts as a switch and a current source for the other. With one set of terminals closed the leakage current is in the order of 300nA, but this depends on the BJTs chosen. With both sets of terminals 21, 22; 41, 42 closed, however, leakage is in the order of 5nA. When both sets of terminals 21, 22; 41, 42 are closed, the equivalent circuit is of two resistors and a reversed biased LED in series.
- 25 The advantage of such a configuration is that a current can be turned on with an open switch and off with a closed switch, and battery life is extended in comparison with other configurations. It has also been determined by experimentation and simulation that a moderately poor contact of 100 Ohms will still operate the circuit perfectly and that moisture across the open contacts has negligible effect. This circuit does not have to be
- 30 run from batteries and has many other applications. This circuit can be fully realised in silicon by using BJT or FET current control in place of the resistors, for example.

In use, the embodiment of Figure 5 will only function when both of the sets of terminals are open. For example, depending on the desired application, one set could act as a safety contact, preventing unwanted activation should the cap of the bottle be damaged  
5 during transportation.

The event is detected by the opening of the electric circuit, as illustrated in the embodiments of Figures 1 to 5. However, other methods of detecting the event can be envisaged. For example, the event may be detected by the closing of the electronic  
10 circuit.

Figure 6 shows the neck of the bottle 10 and cap 11 of a fourth embodiment. In this embodiment, a strip of insulating material 51 is attached to the cap 11 of the bottle 10 and separates the electrical terminals 21, 22. Opening of the bottle causes removal of the  
15 insulating strip and hence closure of the circuit.

Figure 7 shows the neck of the bottle 10, and cap 11 of a fifth embodiment. In this embodiment the terminals 21, 22 are biased towards each other, but kept apart by air pressure where the bottle 10 contains a pressurised or carbonated drink. The terminals  
20 are housed within a tube 61. On removal of the cap 11, the pressure in the bottle drops, and the terminals come together thereby closing the circuit.

However, the embodiment of Figure 4 could be modified such that it is a conducting strip (rather than an insulating strip) that is removed on opening the container. Equally,  
25 the terminals in Figure 5 could be biased away from each other but electrically connected by vacuum pressure in a vacuum sealed container. Therefore either of these embodiments could be used with the circuit of Figure 3, where the event-detecting means is the opening of the circuit.

30 Other embodiments may utilise alternative methods of detecting activating events. These may be, for example, inductive or capacitive coupling, change in capacitance or

inductance, contacts in any removable section of the container, direct contact with container contents, temperature activation, tamper activation, via receipt of an external signal (it could be infra red or radio frequency or other, by the known methods of modulating a carrier frequency) or other electromagnetic method.

5

Initial activation methods are many and varied as already covered and subsequent changes to the activated effect can also be implemented by inductive, capacitive, field effect, human body aerial effect or human body conduction. Second/third etc. stage effects can obviously be additionally implemented.

10

The power source may comprise various types of battery, including rechargeable batteries or photoelectric cells. The power source may also comprise clockwork generation. In the circuit of Figure 3 the value of the second resistor can be decreased in order to decrease sensitivity to moisture across the terminals, and thereby preserve the life of the power source. The circuit is not sensitive to moisture when the effective switch contacts are closed. Moisture will not affect it when in this standby state. Moisture can affect the operation when the contacts are open as the input impedance of the FET gate is extremely high and any current flowing through continuous liquid or wet hands will start to shut off the control current into the bipolar junction transistors, proportionally. This is also what makes it possible to shut it off so effectively for good shelf life. It should be noted that this aspect can be controlled to some degree by having the contacts on opposing sides of the bottle. The power source need not be situated within an indentation in the base of the container, but could be at any suitable location of the container. For example, a photosensitive cell could be located in darkness under the lid of the container. On opening the container, and exposure of the photosensitive cell to light, the circuit is activated and the current required for light-emission from the LED is supplied.

25

Conductors may form an integral part of a label or be attached to the container. The conductors may be situated on the internal or external surface of the container, be embedded into the material of the container, or be a part of the container, or a

30

combination of these. The moulding of the container can be designed to accommodate these features. The control circuitry may or may not be in direct contact with the contents of the container depending on the specific application.

5 The transistor switch circuit could be located on the internal or the external surface of the container. It could be located within a moulded indentation of the container, or embedded into the material of the container. It could be hidden under, or attached to the back of a label, or other material that is subsequently attached to the container.

10 The best effect is obtained from a container fabricated from a translucent material such as frosted glass, or having translucent contents, because of the diffusing effect on the emitted light. However, transparent containers or contents may also be used, especially for purposes other than visual enhancement. The container could be fabricated from any form of plastic (for example, PET or PETE).

15

The whole container may light up, or selected parts of it may light up. The illumination effect can be made time variable so the effect lasts for or starts after a specified period of time or after specified conditions have occurred.

20 The illumination effect may intermittently flicker or pulse, either at random or at regular time intervals. In this way it can be used to attract a consumer's attention to the product whilst it is still sitting on a supermarket or bar shelf. The effect can therefore be used to encourage purchase of the product. A single LED, or any combination and colour of LEDs could be used for this purpose to illuminate for an instant the entire contents of the

25 container or selected parts of it, for example a logo or symbol. Because the power requirements for such an effect are minimal such an effect could last for many months. Of course, a second stage effect could also be utilised such that as well as flickering on a shelf, upon opening a second stage effect was initiated, for example the constant illumination of the entire contents, a logo or symbol. Any colour of LED may be

30 employed. It is preferred that clear lens LEDs are employed so that colour of the emitted light cannot be determined until after activation has occurred. This is



particularly relevant where this system is employed for a promotional competition (for example, a limited number of "winning" containers may emit a different colour to regular containers). Location of the LED "non-specifically" in the base of the container gives a good overall illumination effect. The LED may be located at any other part of

- 5 the container for a non-specific illumination effect. The container may be continuously lit or any combination or pattern of flashing illumination of the whole container or contents or parts of the container may be employed. In particular it may be desirable independently to illuminate a logo or other symbol on the container by embedding the LED within that specific part of the container rather than non-specifically at the base of  
10 the container. Images, logos or other symbols may be projected from the container.

In a further embodiment shown in Figure 8, the bottle 10 has contents likely to be consumed in daylight and/or conditions where there is a significant amount of background illumination, such that its contents cannot be illuminated to a degree where

- 15 they are visible to the consumer (because the background illumination is so intense). In this embodiment, the bottle 10 includes device 71 in the form of a symbol that signifies the brand of the contents of the bottle. The device 71 is moulded from plastic and is embedded with an LED, power source and control circuitry in order to effect illumination. The device 71 is electrically connected to the cap by conductors 15, such  
20 that illumination occurs on opening of the bottle (conductors 15 shown for one for the devices 71 only).

Instead of illuminating the entire bottle, high intensity illumination of the symbol is effected upon activation. The device 71 could be located at any specific part of the  
25 bottle, for example, the neck, the body or the base.

- The symbol may be a logo signifying the contents of the bottle or their brand, or it may be some other type of symbol (for example, an image of a heart or a brain). Specific characters, letters or words may be chosen for illumination. Any other specific part of  
30 the bottle may be illuminated instead of a symbol.

- Alternatively the logo/symbol could be an integral part of the container itself e.g. an embossed or relief section of a glass container or a moulded piece of plastic that is part of a plastic container's main structure. A unit consisting of an illuminating element, power source and chip can then be attached to the container such that the embossed piece
- 5 of glass or the moulded piece of the plastic container illuminates.

Any of the other described activation methods can also be used to effect illumination of device 71.

- 10 If the appropriate changes to the first resistor 23 of the circuit of Figure 3 are made, the circuit can be applied to LEDs with lower voltage drops. Moreover, if a short-lived effect is required, the first resistor can be of a lower value to increase the current, thereby increasing the brightness of the light emitted by the LED, and at the same time reducing battery life.

15

Other embodiments may utilise incandescent, fluorescent, semi-conductor or other electrically activated illumination devices. A neon light could be used. Chemical illumination may also be implemented.

- 20 Multi-coloured illumination effects may be achieved using one or more light sources. The wavelength of the emitted light may be from the visible part of the electromagnetic spectrum, or may be non-visible, such as ultraviolet light or infrared. The effect may result in the contents of the container appearing to change colour.
- 25 A liquid crystal display (LCD) device may be used; for example, an LCD may be embedded with a message. The LCD may be embedded in the container. It may have a dedicated drive circuit and could display a scrolling advertising message, or indicate that the consumer has won a prize. A flexible LCD could be used.

The invention can be used in other types of containers, for example, jars, packaging boxes, cans, packets, blister packets, bags, tins or paste dispensers that are at least partially translucent or transparent.

- 5 Alternative embodiments of the invention may include a cap that is replaceable. In particular, replacing the cap could cause opening of the LED circuit, and cessation of light-emission. In this way, containers can be designed to communicate information relating to the safety of their contents or the status of the container itself, particularly where the contents are hazardous, volatile or perishable. For example, the LED may be
- 10 activated if the lid of a product is not on properly, for example, on medicine bottles where child-proof tops are not on properly, or on containers containing hazardous or degradable materials.

Figure 9 shows an arrangement of a switch 81 and cap 11 suitable for use in this embodiment of the invention. A "child-proof" pill bottle cap 11 is shown. It has been modified such that the top of the inner section is fitted with a membrane switch 81. The wires from the topside of this switch 81 are fed to the circuit in the new top cavity 82 housing a power source, circuit and LED.

- 20 When the cap 11 is fitted to the container properly, the top lip of the bottle pushes up the seal 83 inside the cap, thus activating the membrane switch 81. This changes the state of the circuit to stop the warning illumination, and thereby provides a direct indication that the cap 11 has been re-fitted correctly.
- 25 This embodiment would be useful for example for containers of medicine or any type of pharmaceutical product or for containers that contain hazardous materials.

In this embodiment a flashing illumination effect has the advantage that the power source will last longer. However, a continuous illumination effect may be used.

It may be the lid or the body of the container that illuminates if the lid of the container is not replaced properly.

- Alternatively, activation of the LED may attract the attention of a shopper, for example
- 5 to indicate previous opening of a jar, can or bottle in a supermarket (and thus product tampering). An advantage of this system is that the consumer can tell whilst a jar is still on the shelf in the supermarket whether it has previously been opened; they will not need to wait until opening the product at home, after it has already been bought.
- 10 Preferably, in such "safety" applications, the LED would emit light for longer than 20 minutes. This can be achieved, for example, by inclusion of timing circuitry, which switches off the LED after a specified period of time. Alternatively, use of a flashing light, which may flash randomly or at regular time intervals, could save energy and therefore allow the illumination effect to last for longer. In cases where the LED has
- 15 been activated for too long whilst the container was still in the supermarket and the batteries have run down, failure of the container to light up on opening at home could also indicate a problem with the contents.

In a further embodiment, shown in Figure 10, a toothpaste dispenser 100, in particular a

20 pump dispensing toothpaste container, illuminates. An LED 13 is situated within the uppermost part 101 of the dispenser 100, where it is visible and not covered by a label. Housed with this are a switch 102 and a power source 14. This section of the toothpaste container is manufactured from a transparent material such that the emitting light is easily visible.

25 Upon depressing of the pump dispensing mechanism, a switch 102 under the pump dispensing lever is depressed. This activates a circuit 20 which causes current to flow through the LED 13 included within the dispenser 100. The LED 13 will start to flash. The LED 13 will flash for two minutes, thereby indicating the minimum length of time

30 for which the user should be brushing their teeth.

This arrangement constitutes a timing device. Such an arrangement would be particularly useful for children to gauge the length of time for which they should be brushing their teeth.

- 5 As an alternative to activation by depressing the pump dispenser or by accessing the contents, activation may be by any of the methods described in connection with the embodiments of Figures 1 to 9 or 11. The illumination may or may not be of the specific colour or colours of the container of the toothpaste or of the toothpaste itself and/or may be positioned behind a logo or other symbol. The toothpaste dispenser may
- 10 be partially or wholly transparent or translucent.

- 15 The illumination effect may be constant, intermittent or random, and may be from within or outside any part of the container, depending on the desired effect. Instead of flashing for a specified period of time, the unit could begin to flash after a pre-determined amount of time (to indicate when to stop brushing teeth). Of course, time periods other than two minutes may be envisaged.

- 20 More than one LED 13 may be employed. Depending on the way the LEDs 13 are controlled by the circuitry, various effects can be achieved that are visible through the uppermost part 101 of the dispenser 100.

- 25 In a reusable toothpaste dispenser the power source may comprise, for example, non-rechargeable or rechargeable battery cells. The actual power source used may vary depending on the specific requirements. The circuit design and function may vary depending on the specific requirements.

- 30 In a possible modification of all the above-described embodiments, the sensory stimulation may comprise sound (for example, the playing of a signature tune, a jingle, an alarm buzzer or any form of audio) could be activated instead of, or in addition to, an illumination effect. Alternatively the sensory stimulation may comprise vibration. Other types of sensory stimulation, such as release of a smell, may be envisaged.

A further embodiment is illustrated in Figure 11. A bottle 10 includes a circuit containing infrared components and a power source (not shown). These are integrated into a small package, which is attached to the bottle in a convenient fashion.

5

Upon opening the bottle, infra-red radiation is emitted. If the consumer has a mobile telephone 91 with the facility to transmit and receive infrared signals and transfer data, it is possible to physically position the bottle 10 and the telephone 91 for communication by infrared means. The consumer switches his telephone on, sets it to infra-red mode and 10 directs it at the bottle, which if it is a "winning" bottle, will send a message 92 to the telephone letting the consumer know he has won a prize.

One possible realisation of this concept is to have a pre-programmed logic circuit on the side of the bottle, which, when activated, transmits a call signal awaiting a response from 15 a mobile telephone. Upon receiving that response the pre-programmed logic circuit then transmits a message 92 to the telephone such that the message is registered and remains on the telephone. The telephone then returns a handshake acknowledgement 93 to the bottle 10, which then ceases to transmit the original message 92. At this point it can be conceived that the message or code or data contained within the circuit of the device 20 attached to the container has been transferred or uploaded. This may then be read as a message on a display of the telephone providing instructions for the obtaining of a prize, for example. Since the bottle has stopped transmitting it is not possible for the message or code or data to be transferred to any other telephone thus securing the validity of a once only prize from the one bottle.

25

The message or code or data may then be transferred to the promoters 94 for verification and the remittance of a prize, for example.

Instead of a mobile telephone, the bottle may communicate with other "communication 30 devices" such as a personal digital assistant, or a computer. Activation of the circuit device on the container may be or by any of the methods previously outlined.



This method of adding a communicating facility to a container may also be adapted for other purposes, such as the information of contents, ingredients, place of manufacture, grade, quality, nutritional information, etc.

5

The communication between a container and a communication device may be either digital or analogue and so may be realised by the use of modulated carriers, electromagnetic waves (visible or invisible), sound waves (audible or ultrasonic), pulses, or via direct contact communication, etc.

10

The features of the various embodiments may be interchanged and/or combined as appropriate.

It is apparent that enhancements may be made to improve the value of a container or  
15 contained product by enhancing:

1. The appearance of the contents of the container,
  2. The container itself, or part thereof,
  3. The brand indication,
  - 20 4. The usability of the container and/or its contents,
  5. The functionality of the container,
  6. The supply of information relating to the container and/or its contents, or its manufacturer,
  7. The security of the container and/or its contents,
  - 25 8. The validity of the container and/or its contents,
  9. The attractiveness of the container and/or its contents,
  10. The protection of the container and/or its contents,
  11. The self-advertising of the container and/or its contents,
- 30 The present invention specifically covers the concept of achieving any or all of the above by the attachment to the container of a device or devices designed to achieve the desired

enhancements, such that the container and its contents and the enhancements are portable, and where the contents are usable in the same fashion as they would be without the enhancements.

- 5 Enhancements may include the use of illumination, sound, movements, vibrations, electronic displays, electronic communication of information, chemical communication of information, including a combination of any or all of these.

Electronics may be employed in order to realise any or all of the above enhancements.

10

The invention has been defined in specific embodiments by way of example and the skilled addressee will understand that various items of the proposed embodiments may be varied or exchanged without departing from the scope of the invention.

CLAIMS

1. A portable container, including means for producing an output signal, means of detecting opening of the container, a self-contained power source, and connecting means for connecting the means for producing an output signal with the means of detecting opening of the container and the self-contained power source, such that on opening the container the power source causes production of an output signal.  
5
2. A container as claimed in claim 1 wherein the output signal comprises a form of sensory stimulation.  
10
3. A container as claimed in claim 1 or 2 wherein the output signal is light.
4. A container as claimed in any preceding claim wherein the container is substantially filled with a flowable or dispensable product.  
15
5. A container as claimed in any preceding claim wherein the container contains a consumable product.  
20
6. A container as claimed in any preceding claim wherein the container is a bottle, a jar or a paste dispenser.
7. A container as claimed in any preceding claim wherein the means for producing an output signal comprises at least one light-emitting diode.  
25
8. A container as claimed in any preceding claim wherein the container is partially illuminated.
9. A container as claimed in any preceding claim wherein the container includes a symbol or logo, and the symbol or logo is illuminated.  
30

10. A container as claimed in any preceding claim wherein the connecting means comprises an electric or electronic circuit, and the opening of the container is detected by the opening or the closing of the circuit.
- 5      11. A container as claimed in any of claims 1, 4 to 6 or 10, wherein the output signal comprises a form of wireless communication
- 10      12. A portable container including light-emitting means, event-detecting means, a self-contained power source, and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, wherein the container is at least partially fabricated from a material able to transmit light.
- 15      13. A container as claimed in claim 12 wherein the container is substantially filled with a flowable or dispensable product.
- 20      14. A container as claimed in claim 12 or 13 wherein the container contains a consumable product.
- 25      15. A container as claimed in any claim 12, 13 or 14 wherein the container is a bottle, a jar or a paste dispenser
16. A container as claimed in any of claims 12 to 15 wherein the activating event comprises the opening of the container.
- 25      17. A container as claimed in any of claims 12 to 15 wherein the activating event comprises non-closure of the container.
18. A container as claimed in any of claims 12 to 15 wherein the activating event comprises exposure to a specific temperature or range of temperatures.

19. A container as claimed in any of claims 12 to 18 wherein the light-emitting means comprises a light-emitting diode.

20. A container as claimed in any of claims 12 to 19 wherein the connecting means  
5 comprises an electric or electronic circuit, and the event is detected by the opening or the closing of the circuit.

10 21. A device comprising light-emitting means, event-detecting means, a power source, and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, for use with a container as claimed in any of claims 12 to 20.

22. A device as claimed in claim 21 in the form of a label for attachment to the container.

15 23. A device as claimed in claim 21 or 22 in the form of a symbol or logo.

24. A system for communicating information comprising:  
a portable container;  
the container including event-detecting means;  
20 display means;  
means of communication between the container and the display means;  
such that on detection of an event information is communicated to the display means and subsequently displayed,  
wherein the means of communication between the container and the display means are  
25 wireless.

25. A system as claimed in claim 24 wherein the display means are capable of transmitting and receiving infra-red signals and the container further includes a circuit containing means for transmitting and receiving infra-red signals.

26. A system as claimed in claim 24 or 25 wherein the information displayed comprises a message.
27. A system as claimed in claim 24, 25 or 26 wherein the event comprises opening of  
5 the container.
28. A container containing a consumable product, including means for producing an output signal, means of detecting opening of the container, a self-contained power source, and connecting means for connecting the means for producing an output  
10 signal with the means of detecting opening of the container and the self-contained power source, such that on opening the container the power source causes production of an output signal.
29. A container including light-emitting means, event-detecting means, a power source,  
15 and connecting means for connecting the light-emitting means with the event-detecting means and the power source, such that light is emitted on detection of an event, wherein the container is at least partially fabricated from a material able to transmit light.
- 20 30. A container substantially as hereinbefore described with reference to and as illustrated in each of the accompanying drawings.
31. A system for communicating information substantially as hereinbefore described with reference to and as illustrated in Figure 11 of the accompanying drawings.
- 25 32. A circuit substantially as hereinbefore described with reference to and as illustrated in the accompanying Figure 3, Figure 4 or Figure 5 of the accompanying drawings.

ABSTRACT  
CONTAINERS

A container 10, for example a drinks bottle, comprises means of producing an output  
5 such as a light signal 13 when the container is opened. Opening the container 10 causes switching of a detector circuit 20 included in the container 10, which in turn causes production of the output signal. Removing a cap 11 of the container 10 may directly close or open a switch 21, 22 within a detector circuit 20. Alternatively the switch 21,  
10 22 may be activated by a change in pressure within the container, or by temperature.  
Accessing the contents of a toothpaste dispenser causes illumination of at least a part of the dispenser. Illumination continues for the length of time for which brushing of teeth should be carried out.

Figure 1 to accompany the abstract

10/10

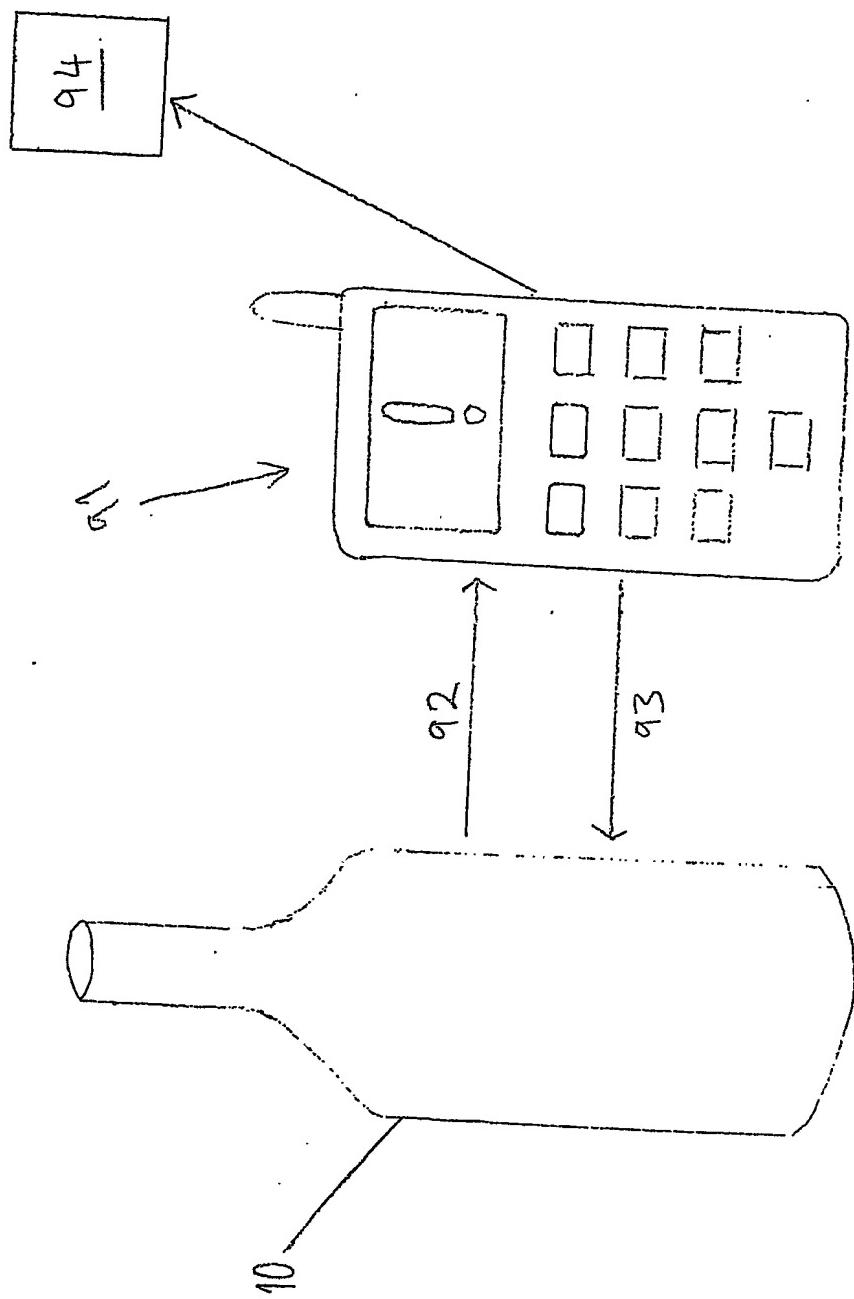


Figure 11

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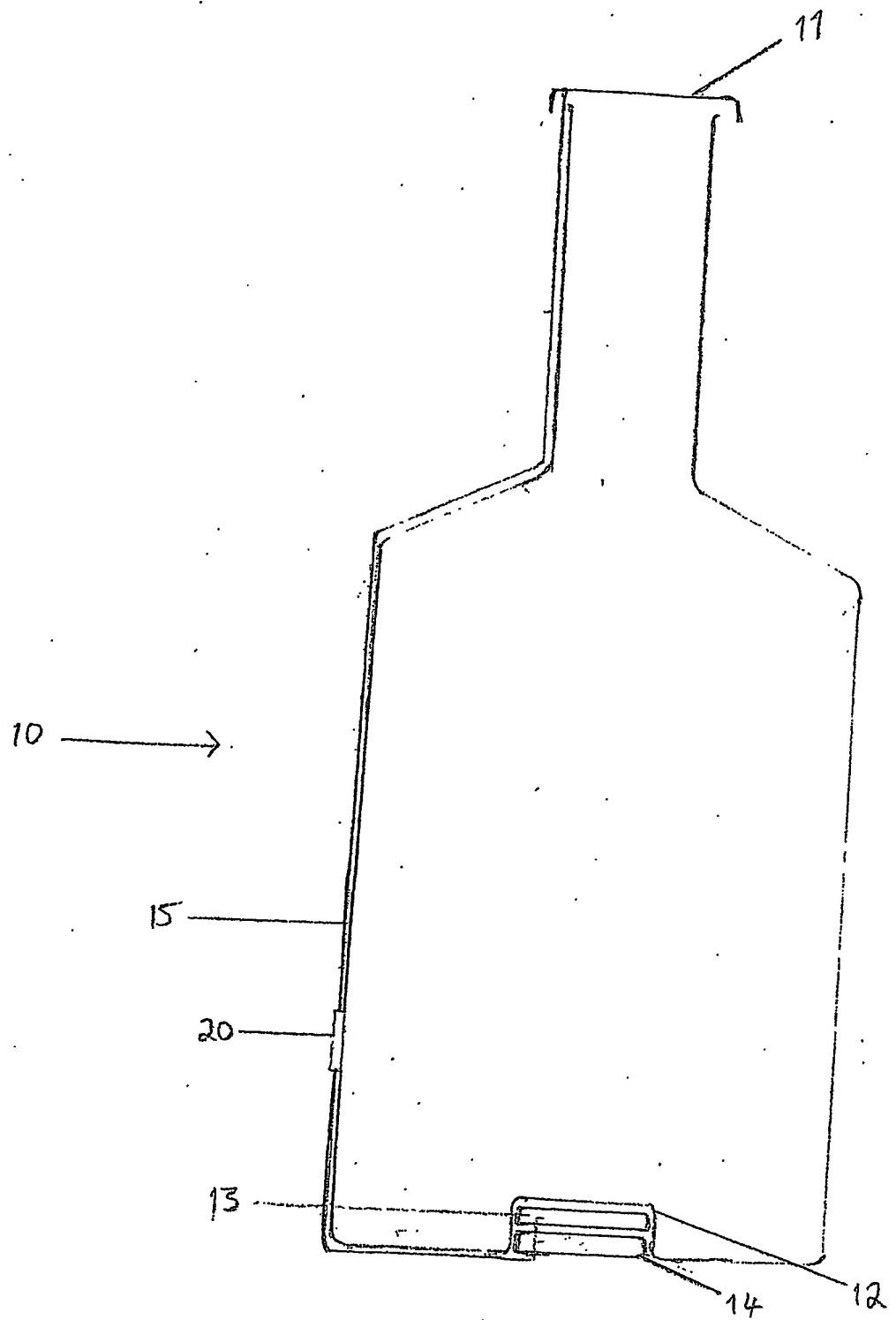


Figure 1

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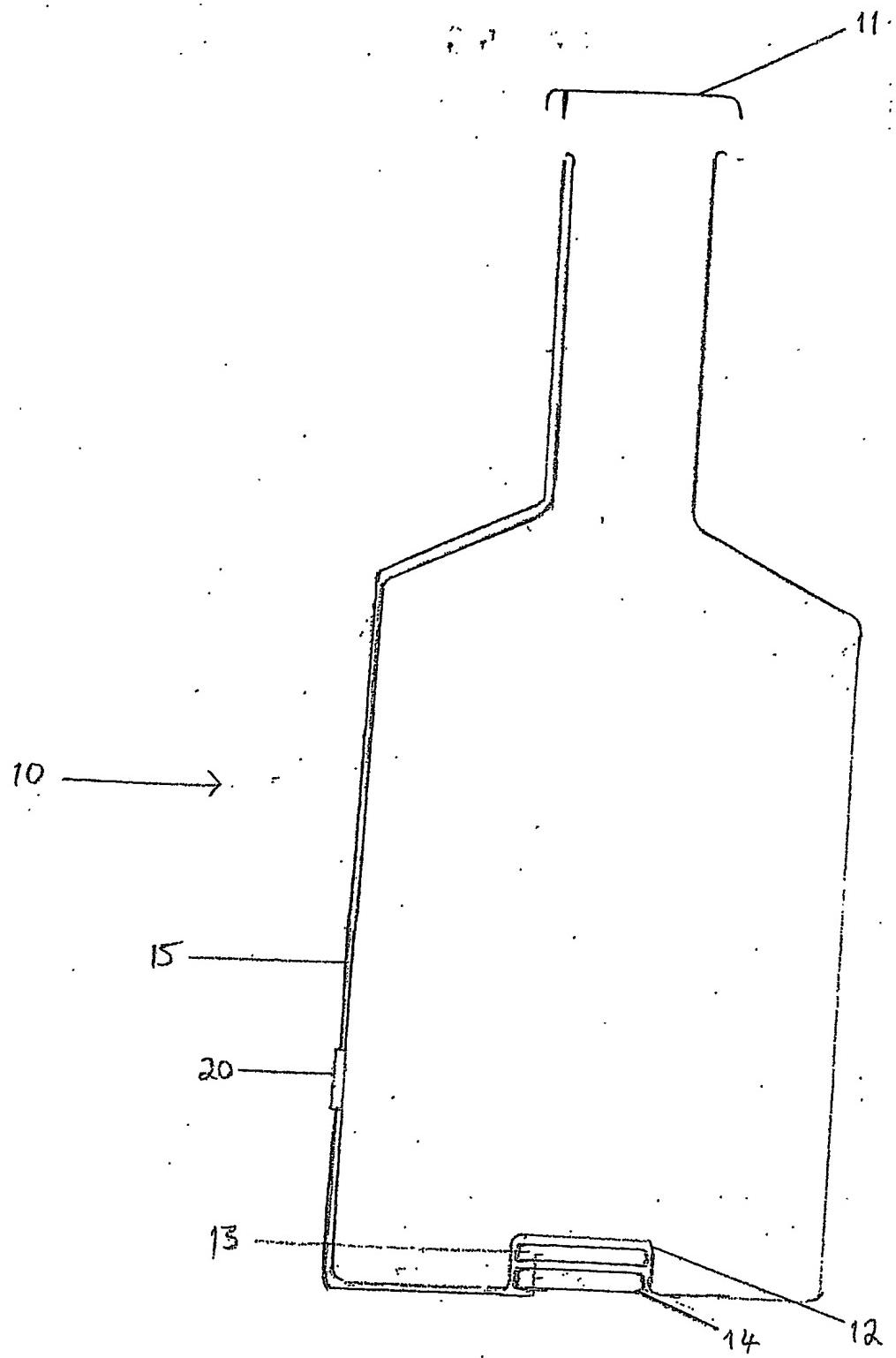


Figure 2

3110

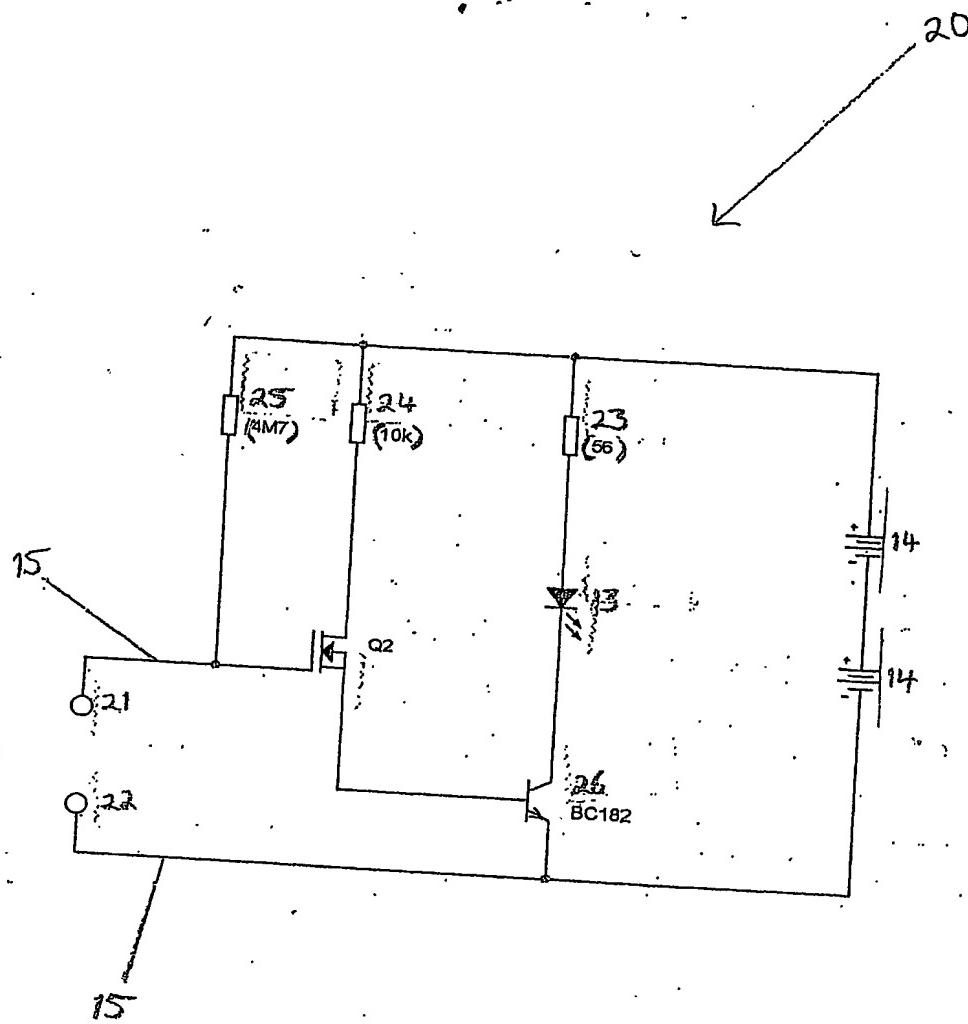


Figure 3

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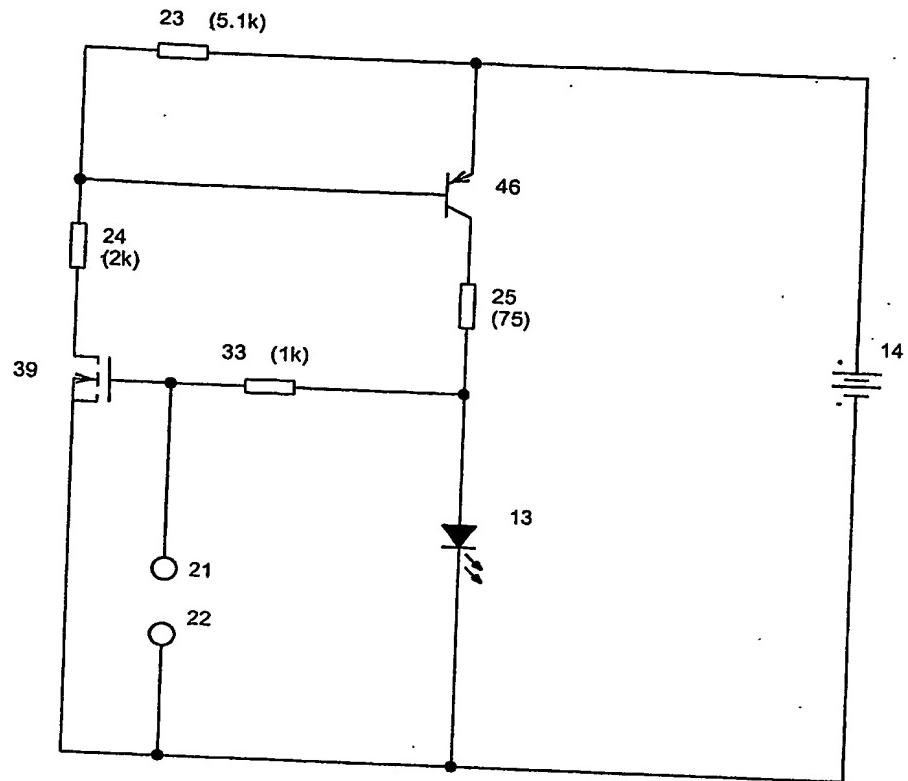


Figure 4

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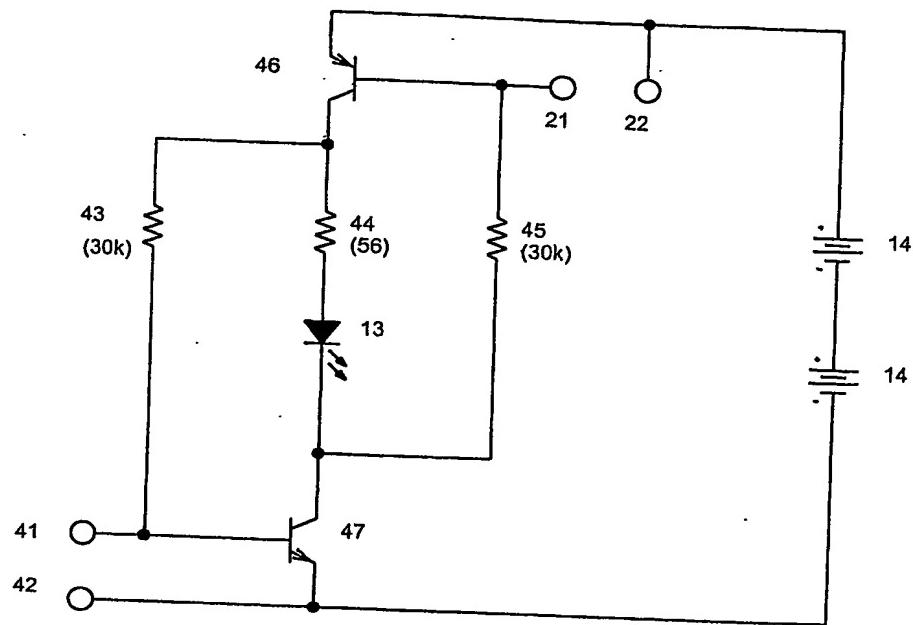


Figure 5

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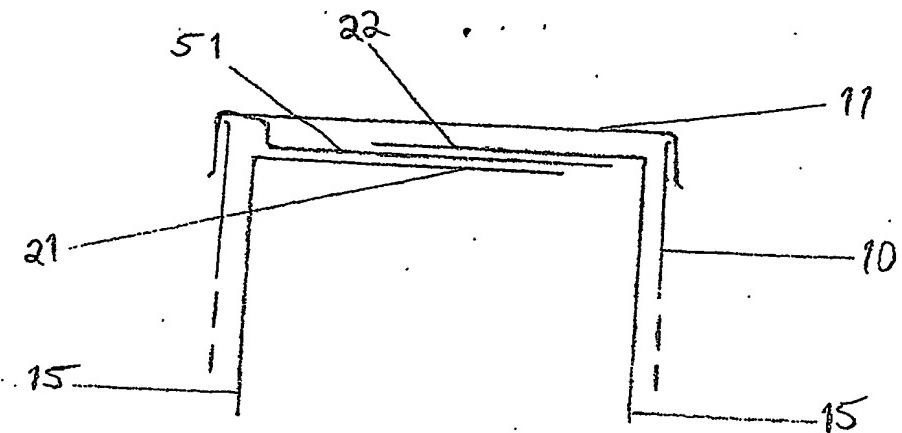


Figure 6

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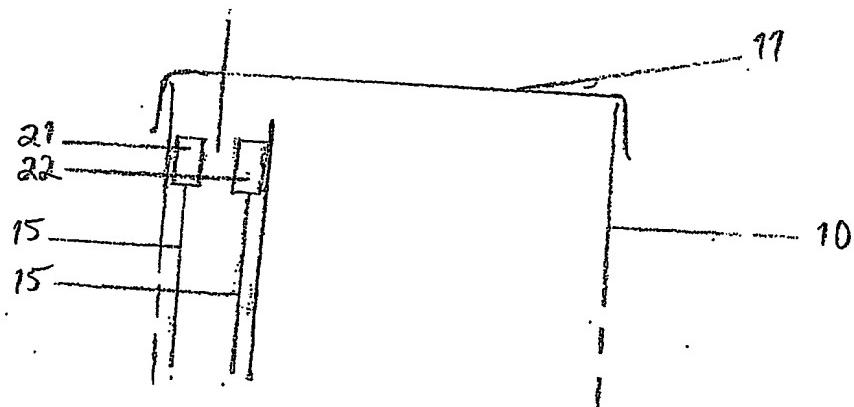


Figure 7

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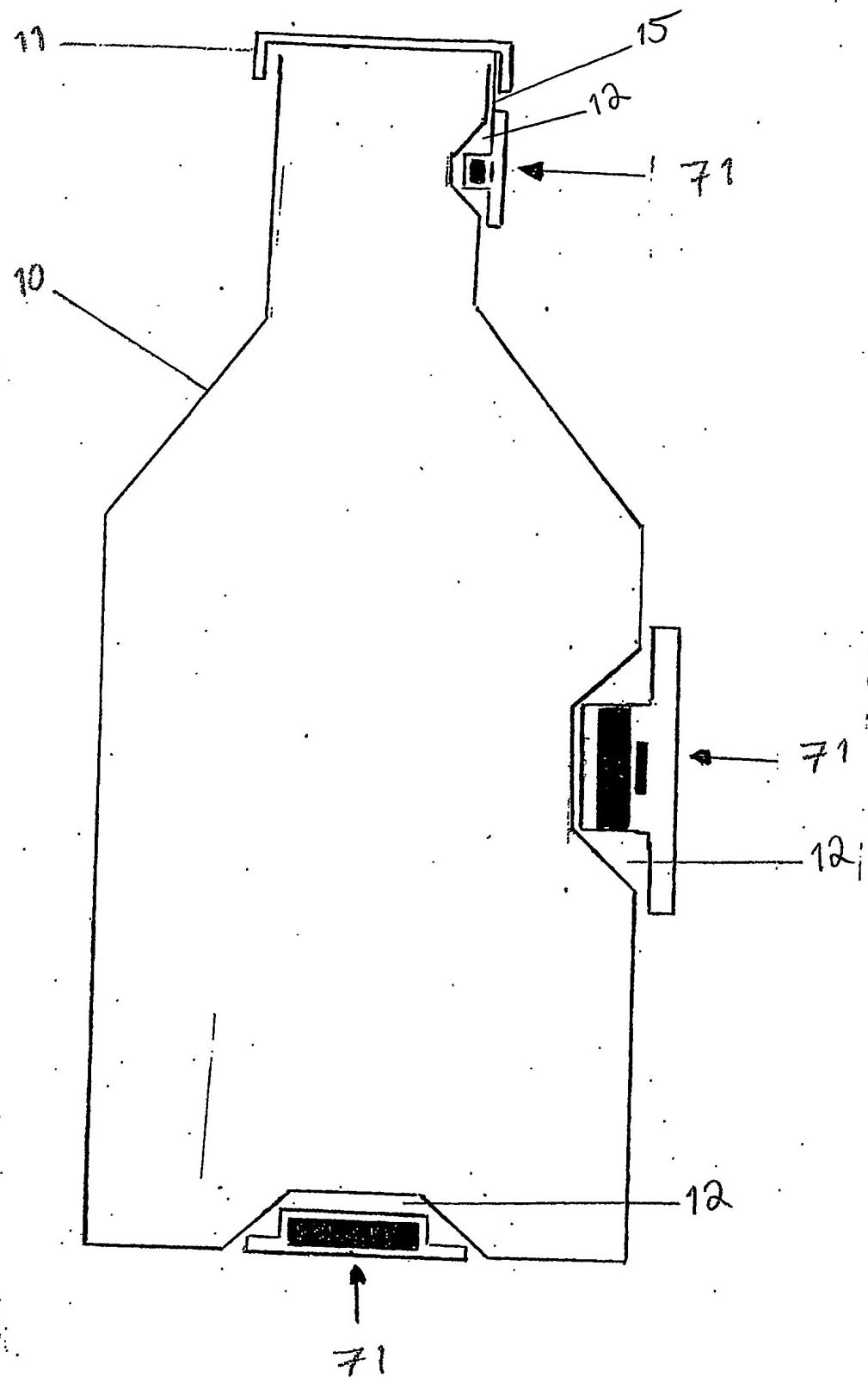
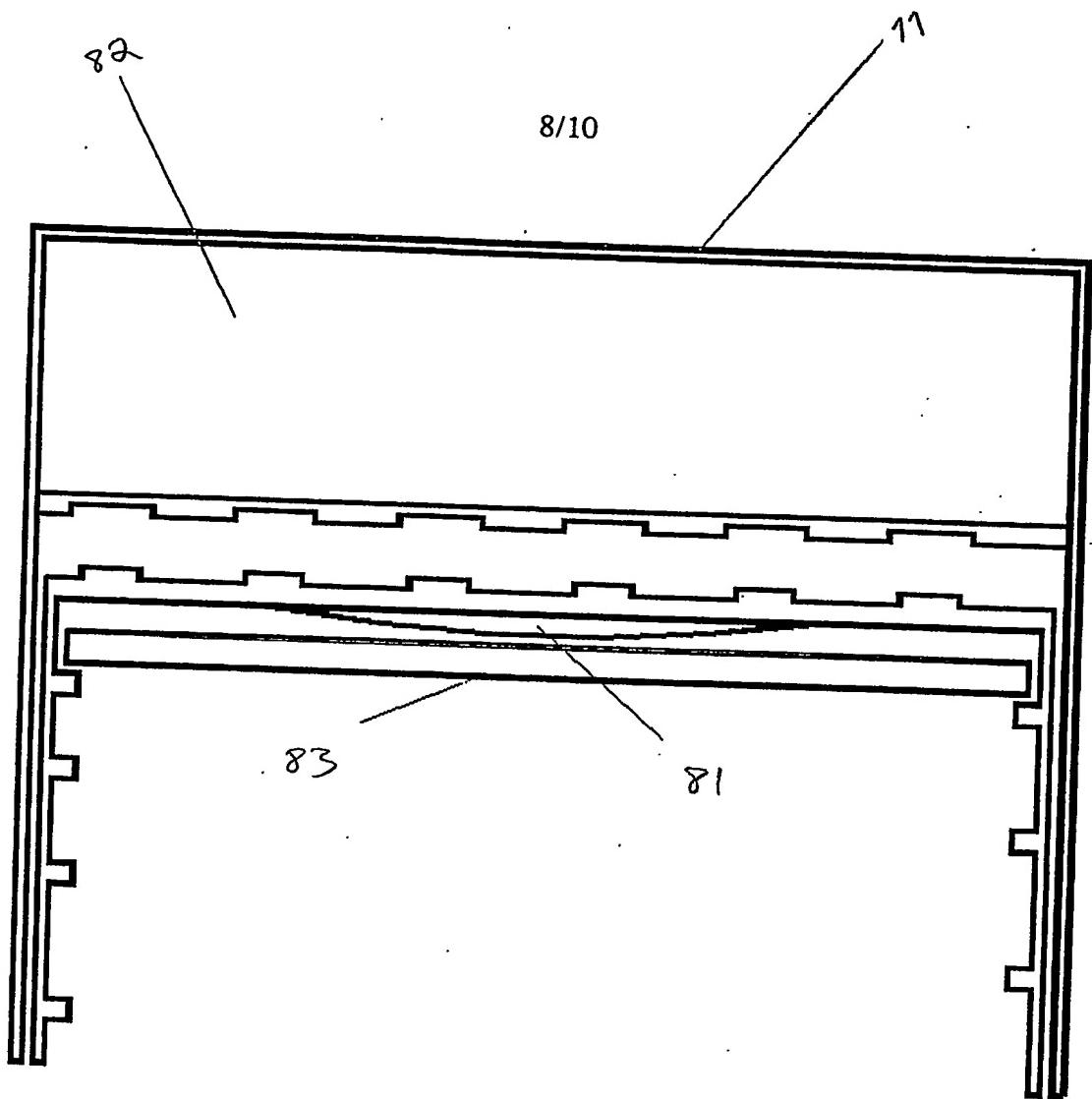


Figure 8



**Figure 9**

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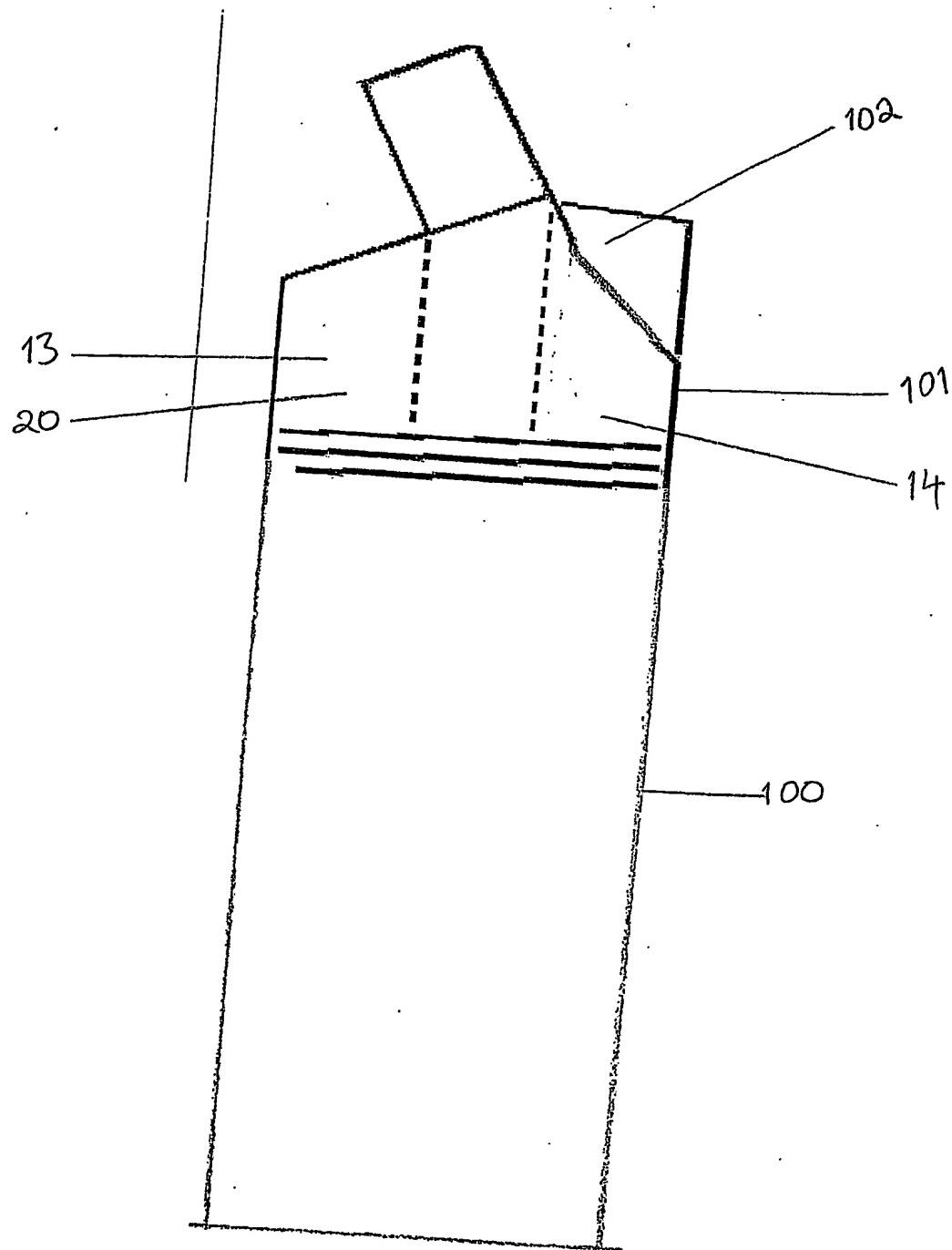


Figure 10

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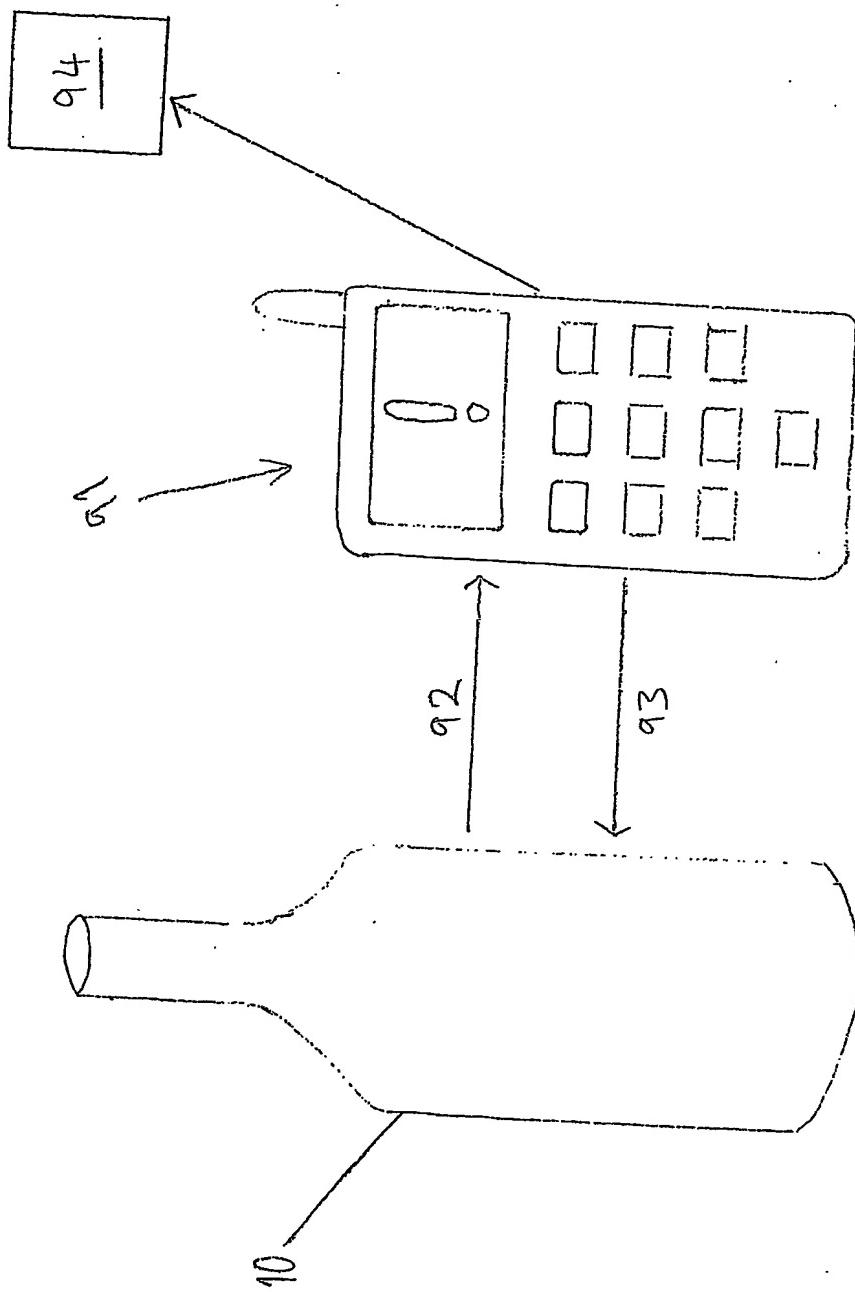


Figure 11

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